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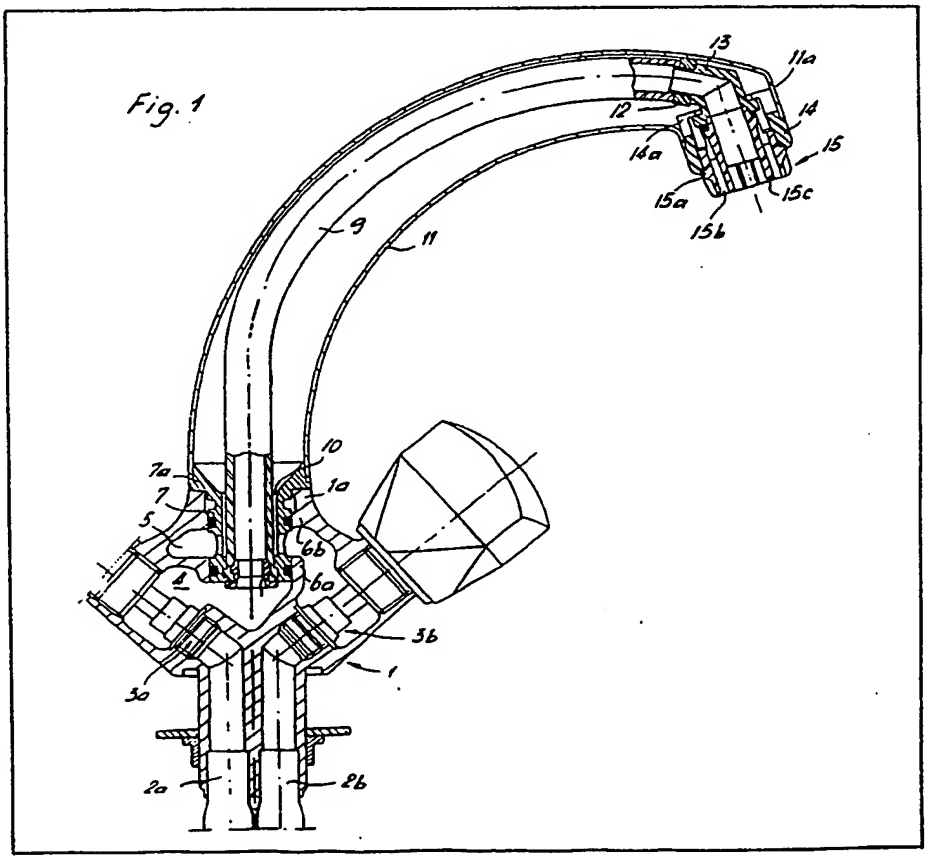
(54) Sanitary fittings

(57) The external outlet pipe conveying cold water 11 is a hydraulically deformed thin-walled pipe having a cross-section narrowing from the inlet towards the outlet. The outlet extremity 11*a* of this outlet pipe 11 is angled over and terminates in a holding ring 14 having an internal screw thread. The hot water passage is a flexible tube 9 traversing the external outlet pipe 11. At the inlet side, the tube 9 is fastened to a guiding pipe section 7 installed in the housing 1 of the fitting, co-axially to the corresponding terminal part of the external outlet pipe 11. At the outlet side, the tube 9 is fastened on a connector of a coupling pipe element 13 the other connector of which, centred co-axially in the angled-over terminal section 11*a* of the external outlet pipe, is joined hermetically under thrust to the internal sleeve 15*c* of a jet divider insert 15. The external sleeve 15*a* of the insert 15 is screwed into the holding ring by means of an external screw thread, so that the whole jet divider insert may be unscrewed manually. The opening portion of the internal sleeve 15*c* is conically chamfered at the outside, at an acute angle; a negative pressure area causing rapid mixing of the two separately supplied water flows is thereby engendered in the cold water outlet.



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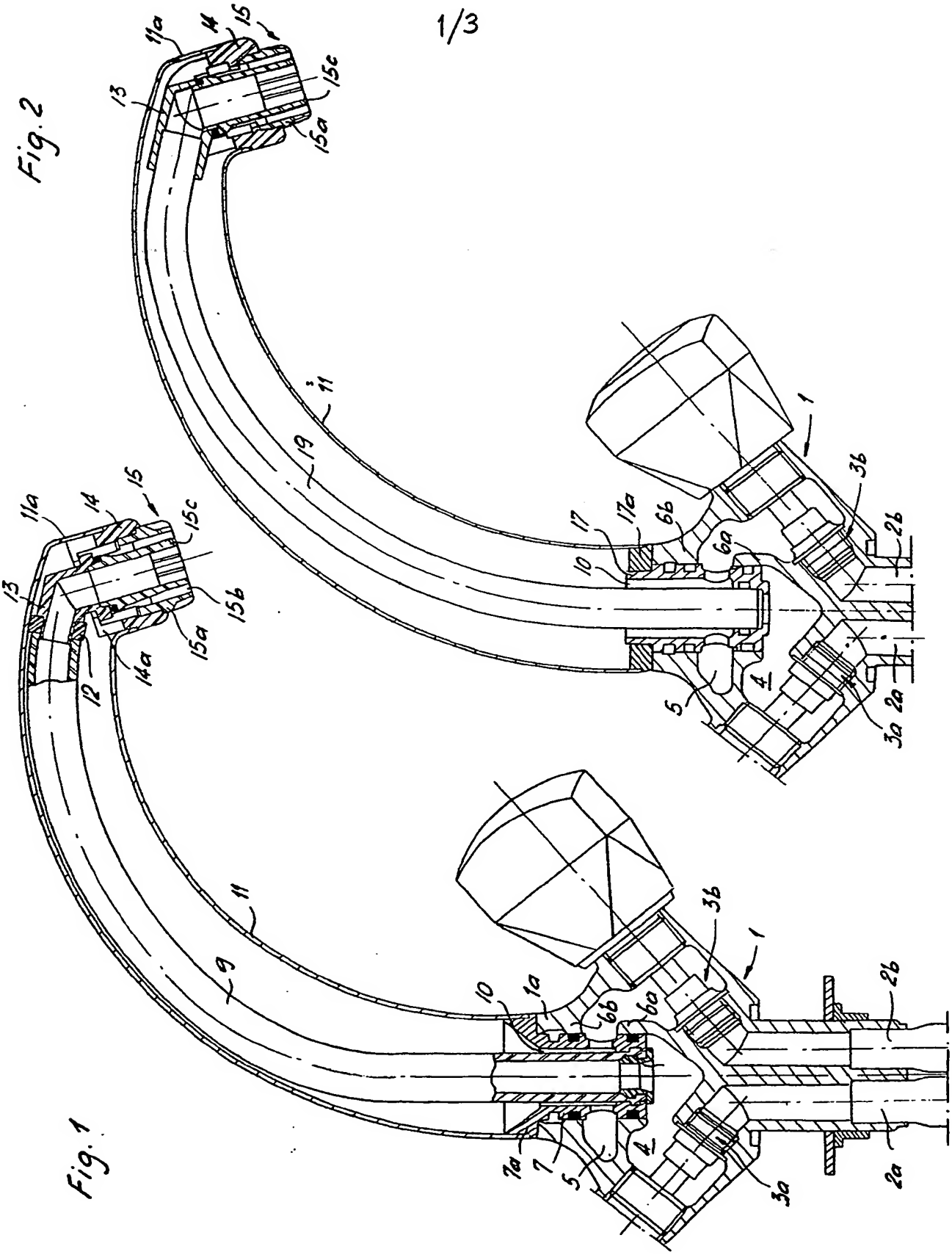


Fig. 2

Fig. 1

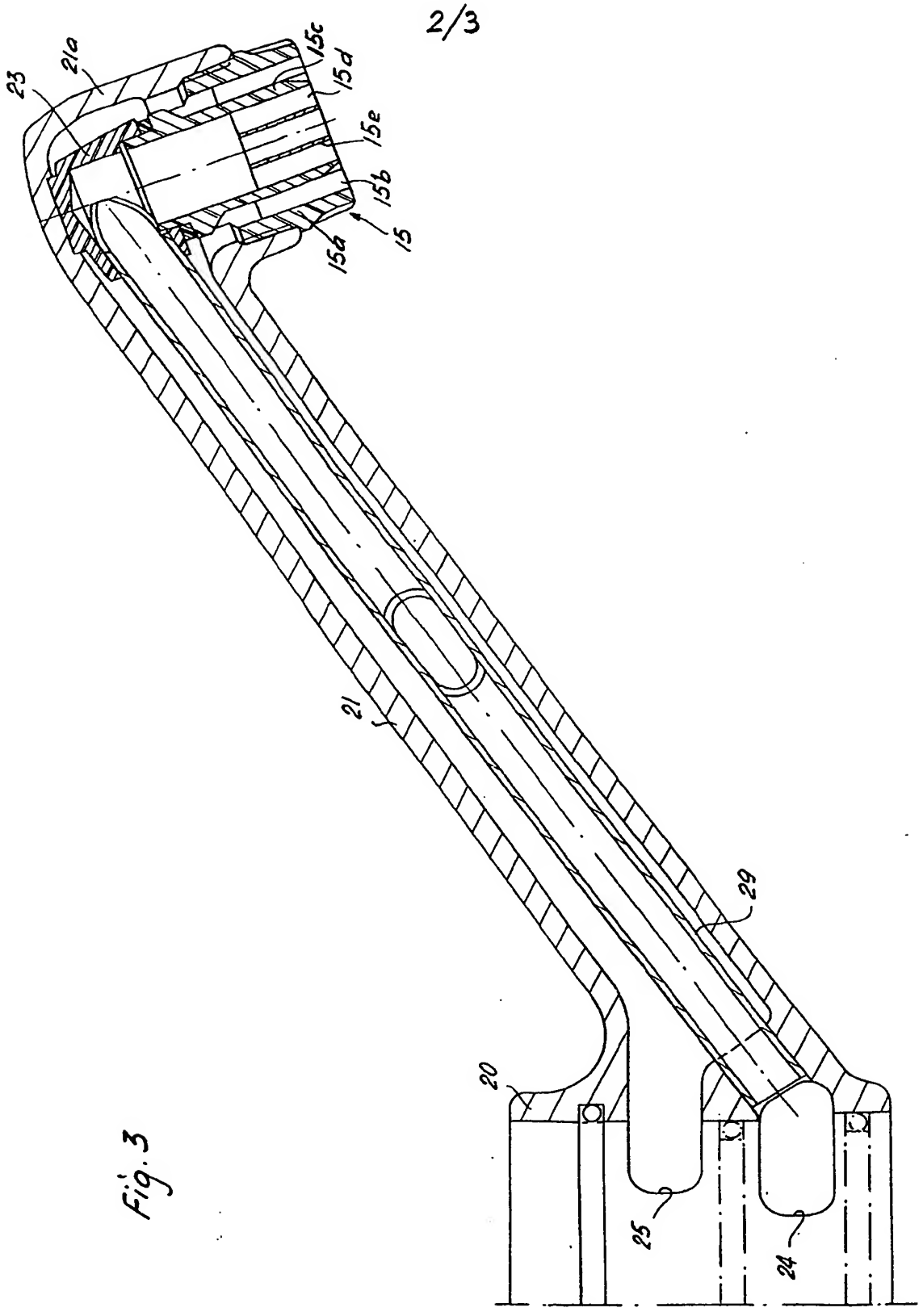


Fig. 3

Fig. 4

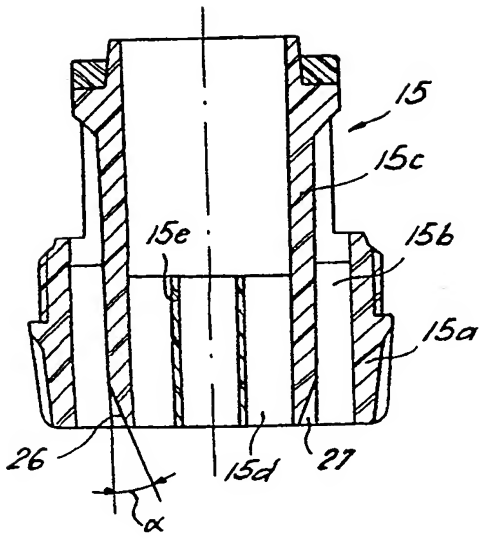
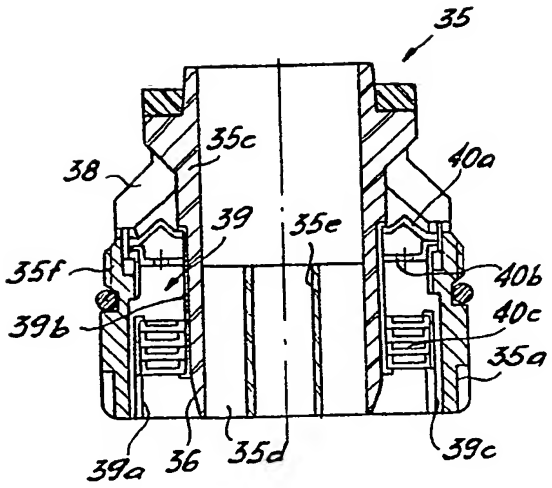


Fig. 6



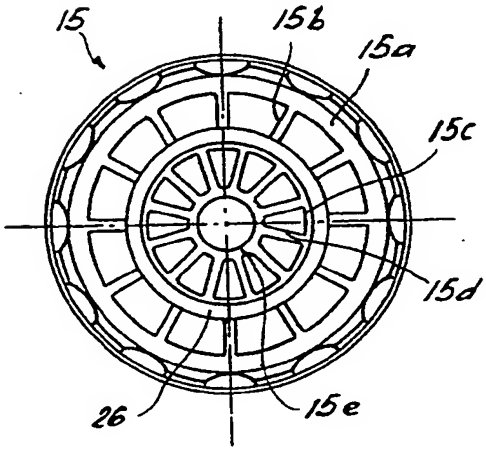


Fig. 5

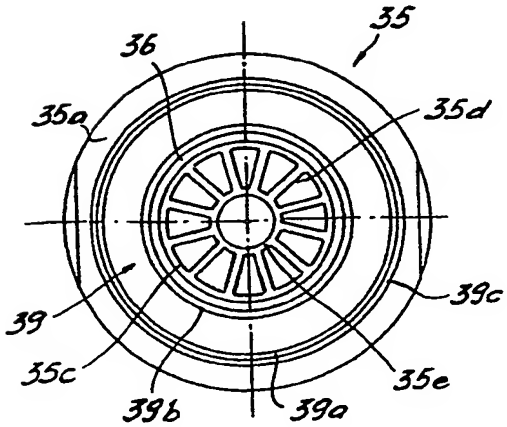


Fig. 7

SPECIFICATION
Sanitary fittings

The present invention relates to sanitary fittings for cold and hot water, and particularly to outlet devices therefor.

Outlet devices of this nature are known, which have a generally straight cast pipe comprising mutually parallel outlet passages for cold and hot water formed by an internal partition of the pipe. This structure, which is generally also quite costly, primarily has the disadvantage that upon drawing hot water, the pipe section which conveys hot water, may lead to the user sustaining scalded hands; the perfect mixing of the water flows travelling side-by-side in equi-directional flow to a mouthpiece or nozzle commonly comprising co-axial outlets, also raises difficulties in view of the necessary cross-sectional variations. On the other hand, outlet devices of the said kind are known, which have a commonly curved external cold water pipe and a hot water pipe co-axially fitted therein and spaced from the outer surface. In a construction of this nature, the two pipes have to be inserted one into another whilst still in the straight condition and then bent into the required shape subsequently and simultaneously by means of appropriate mechanisms. This represents a fairly complex production method.

Other examples of these outlet devices are known, which allow both water-ducting passages to open into a nozzle formed by co-axial tubular elements, the central pipe section opening acting as a hot water outlet whereas the annular opening formed by the external pipe element acts as a cold water outlet. It is also known that it is possible to insert separate jet dividers into the pipe section nozzles situated in a common plane. In this connection, it is disadvantageous above all that lime deposits are frequently formed in the outflow plane, a removal or replacement of the clogged jet dividers being possible only by means of a tool and as a rule it is difficult to do this without damaging the exit orifice.

It is an object of the invention to provide an outlet device of the kind specified, the exit orifice of which is provided with jet dividers which may easily be disassembled and allow of particularly good water flow mixing, and the water-ducting outlet pipes of which are not only easily produced and installed but simultaneously afford optimum protection to the user against scalded hands.

To this end, the invention consists in a sanitary fitting having an outlet device for cold and hot water, comprising a hot water passage separately led to the outlet within the outflow pipe ducting cold water, wherein the outer outflow pipe conveying cold water terminates in an angled-over exit orifice having an internal screw thread into which is screwed a jet divider insert the portion of which projecting beyond the exit orifice forms a radially external annular opening for cold water and a co-axial internal tubular opening for hot water, the internal sleeve of the sleeves forming the two openings bearing tightly against a coupling pipe section which latter is secured to the outlet-side extremity of the hot water passage.

Advantageously, the jet divider is such that the coupling webs between the two sleeves extending flush at the opening side are jet divider webs at the same time which traverse the annular opening. In another particularly advantageous embodiment, an aerator is inserted into the annular space left between the two sleeves, which thus allows a gentle jet pattern to be formed in the cold water outlet by means of air drawn in by suction.

An additional and particularly important advantage results if a vacuum area is established immediately in front of the opening between the two flows of water still leaving this opening separately; this enables the two flows of water to be mixed effectively and directly, i.e. already a few centimetres after leaving the plane of the opening. In particularly appropriate manner, this vacuum area may be produced by virtue of the fact that the outer side of the internal sleeve conveying hot water is chamfered conically under an acute angle, the annular passage conveying cold water thereby being commensurately enlarged inwardly. An angle of between 15° and 25° proved to be particularly advantageous in this connection.

The jet divider insert may be utilised in particularly advantageous manner in all cases in which the hot water duct is a separate internal pipe (or tube) inserted offset from the axis into an external pipe conveying cold water. In this connection, the system is so organised to advantage, that the two pipes extend co-axially at the inlet side, so that a particularly appropriate connection to the housing of a twin-knob mixer fitting is rendered possible in this manner; in doing so, as may be observed, the internal tube may be inserted into the external pipe only after finishing i.e. shaping the external pipe. This may be facilitated in particular by selecting a comparatively large cross-section for the external pipe as compared to the cross-section of the internal pipe. To this end, an external pipe which is hydraulically shaped in particularly advantageous manner, or a cast external pipe, is appropriately provided for the external pipe. It is thereby possible to give the external pipe a larger cross-section at the inlet side, which diminishes towards the outlet side, this has proved to be particularly advantageous.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings which show certain embodiments thereof by way of example and in which:—

Figures 1 and 2 show axial cross-sections of an embodiment of a twin-knob mixer fitting, with a modified form of the inventive outlet device,

Figure 3 shows an axial cross-section of an outlet device for a mechanical mixer fitting,

Figure 4 is an illustration to enlarged scale and in cross-section of a jet divider insert for the outlet devices according to Figures 1 to 3,

Figure 5 shows an end view corresponding to Figure 4,

Figure 6 shows a jet divider insert with an aerator in a cross-section similar to Figure 4, and Figure 7 shows an end view corresponding to Figure 6.

Referring now to the drawings, in the example shown in Figure 1, the housing of the fitting is marked 1, the supply pipes for hot and cold water are marked 2*a* and 2*b*, and the corresponding valves 3*a* and 3*b*. The bore of the hot water valve 3*a* leads into a central housing chamber 4, whereas the bore of the cold water valve 3*b* opens into an annular housing chamber 5. A guiding pipe element 7 is tightly inset into central openings of two radial webs 6*a*, 6*b* of the housing 1 which axially delimit the housing chambers 4, 5: the one extremity of a tube 9, e.g. of silicone rubber, is hermetically secured by means of a clamping ring 8 in the guiding pipe element 7 in the area of the web 6*a* upwardly delimiting the chamber 4.

Above the web 6*a*, the guiding pipe element 7 is expanded a little whilst leaving an annular gap 10 between the guiding pipe element and tube 9, and is seated with an internally taperingly expanded flange portion 7*a* on the upper connector stub 1*a* of the housing 1. On this flange portion 7*a* is secured the one extremity of an external outlet pipe 11, e.g. by brazing. This external outlet pipe 11 which is bent through approximately a quarter-circle and angled over a little at the outlet extremity at 11*a*, is produced by hydraulic upsetting from a straight cylindrical pipe having a wall thickness appropriately of between 0.5 and 1.5 mm. The hydraulic upsetting operation on the external outlet pipe 11 in a corresponding female mould renders it possible in uncomplicated manner to give the outlet pipe an aesthetically pleasing curved shape apart from a diameter diminishing constantly from the inlet to the outlet extremities. The tube 9 which is connected to the hot water supply 2*a* via the chamber 4 and the valve 3*a*, extends through the external outlet pipe 11 which is connected to the cold water supply 2*b* via the annular gap 10, the chamber 5 and the valve 3*b*. The outlet-side extremity of the tube 9 is clamped by means of a clamping ring 12 on the inlet connector of an angled coupling pipe element 13 the outlet connector of which projects with radial play and co-axially into the angled-over terminal section 11*a* of the external outlet pipe 11. The terminal pipe section 11*a* is then secured to a securing or holding ring 14, e.g. by brazing, which holding ring 14 engages with angled lugs 14*a* behind a terminal flange of the coupling pipe section 13 and thereby immobilises the latter in its position.

The holding ring 14 is provided with an internal scr w thread into which is screwed the xternal sleeve 15*a* provided with a matching external screw thread of a jet divider assembly generally indicated at 15. Radial jet divider vanes 15*b* connect the external sleeve 15*a* to an internal sleeve 15*c*; the internal sleeve 15*c* extending flush with the external sleeve 15*a* as the opening side projects internally beyond the external sleeve and is thrust firmly against the terminal flange of the coupling element 13 with interpositioning of a seal 16. The entire jet divider insert may be screwed in and out manually without any difficulty.

Due to the utilisation of a flexible tube 9 as an outlet passage conveying hot water, the tube 9 on which the coupling element 13 is fitted beforehand, may be pushed into the outlet pipe 11 from the outlet side and secured in the guiding pipe element 7 by means of the clamping ring 8, whereupon the jet divider set or assembly 15 may be screwed in. The tube 9 consisting of thermally insulating material and situated within the outlet pipe 11 conveying cold water also prevents an excessive heat absorption by the outlet pipe 11 at the points at which it is placed in contact with the external pipe by flexural stresses arising during insertion into the same.

An embodiment for preventing this contact of the outlet passage conveying hot water on the external outlet pipe 11 is illustrated in Figure 2. In this case, the passage conveying hot water is formed by a copper pipe 19. Upon installing the copper pipe 19 which is pre-bent a little more shallowly than the outlet pipe 11 and secured on the coupling pipe element 13, for example by bonding, the same is inserted from the guiding side and without contact with the outlet pipe 11 into the latter and inserted into the terminal portion of the guiding pipe element 17 provided with an O-ring 18, e.g. under application of a sealing adhesive. This guiding pipe element 17, which has two parts in this case, has an external screw thread at the outlet-side extremity, on which is screwed a terminal ring 17*a* carrying the external outlet pipe 11. As for the rest, this modified form corresponds to the example in accordance with Figure 1.

Figure 3 shows an outlet device for a mechanical mixer fitting; this outlet device has a sleeve element 20 co-axially enflanking the central valve and actuation part of the mixer (not illustrated), which is hermetically and rotatably installed on the valve element and is provided with inlet perforations 24, 25 for hot and cold water. The sleeve element 20 is integrally joined to a cast pipe 21 having a straight flattened cross-section, the angled-over opening portion 21*a* of which is cylindrical. The internal pipe 29 which appropriately consists of plastics material and is connected to the hot water supply via the perforation 24, extends in the outlet pipe 21 connected to the cold water supply via the perforation 25. The terminal portions of the internal pipe are appropriately cylindrical whereas the principal section of this pipe has a flattened cross-section. At the outlet-side extremity, the internal pipe 19 leads into a coupling pipe element 23 centred on the external pipe 21 and co-axial with the angled-over terminal pip section 21*a*. The terminal pipe section 21 is provided with an internal screw thread, into which is screwed the matching external screw thread of the external sleeve 15*a* of a jet divider insert 15 the internal sleev 15*c* of which is joined under thrust to the

outlet side of the coupling element 23 with interpositioning of a seal.

The jet divider insert 15 of the kind provided in the outlet devices described in the foregoing, is illustrated more clearly in Figures 4 and 5. A particularly essential feature of this jet divider insert provided with jet divider vanes 15*b* and 15*d* for the annular cold water flow as well as for the central hot water flow, consists in establishing a vacuum area right at the nozzle egress of the two water flows. The passages formed by the internal jet divider vanes 15*d* springing in stellate form from a central cylindrical sleeve 15*e* have a constant cross-section throughout. By contrast thereto, the passages formed by the external jet divider vanes 15*b* are widened conically inwards at the opening extremity, which is obtained by means of a correspondingly tapering chamfer 26 of the opening extremity of the internal sleeve 15*c* of the jet divider insert 15. The radially inward edge of the jet divider vanes 15*b* is however extended rectilinearly up to the opening, i.e. is set back from the chamfer 26, so that a vaneless annular space 27 is formed thereat. The enlargement of the passage for the cold water flow obtained by means of the chamfer 26, the flow velocity of which is commonly substantially greater than that of the hot water flow in the conventional sanitary systems, engenders a definite vacuum thereat, which results in practically instantaneous mixing of the two water flows. In this connection, it was discovered that the acute-angled chamber 26 appropriately has a cone angle α (Figure 4) of between 15° and 25°, but advantageously of approximately 20°.

It is desirable in numerous cases to obtain an aerated gentle water jet. As known, this is accomplished by means of aerators, in which air is supplied to the flow of water prior to its egress (either radially from the outside or axially from the opening). A jet divider insert 35 of this kind and comprising an aerator, is shown in Figures 6 and 7. This insert comprises three parts and is formed by a bearer element 35*a* provided with an external screw thread 35*f* for screwing into the holding ring 14 of the embodiments according to Figures 1 and 2, or into the opening section 21*a* of the embodiment according to Figure 3. The internal sleeve 35*c* (appropriately consisting of plastics material) of the jet divider insert rests via the supporting fins 38 on this bearer element 35*a* forming the external sleeve of the insert. In the assembled state, the internal sleeve 35*c* is thrust, as in the example according to Figure 4, and under inter-positioning of a seal, against the coupling element of the internal outlet pipe conveying hot water, wher as it is provid d at the opening side with the chamfer 36 engendering the vacuum ar a. In this case too, the internal j t divided vanes 35*d* depart from a central sleeve 35*e*. An aerator ring 39 is inserted into the passage conveying cold water, which is formed between the bearer element 35*a* and the internal sleeve 35*c*. Said aerator ring 39 has an internal and an external sheet metal sleeves 39*b* and 39*a* with inset sieves 40*a*, 40*b* and 40*c*, and is inset into the annular passage, in such manner that the part of the sheet metal sleeve 39*a* which radially outwards delimits the axially external sieve packet 40*c* forms a comparatively narrow air suction intake passage 39*c* with the bearer element 35*a*. The air drawn from the opening in known manner by the suction effect of the cold water flow is mixed with this cold water flow over the sieve packet 40. In this case too, the jet divider insert 35 as a whole may be removed in uncomplicated manner from the outlet pipes of the device by unscrewing the bearer element 35*c*.

CLAIMS

1. A sanitary fitting having an outlet device for cold and hot water, comprising a hot water passage separately led to the outlet within the outflow pipe ducting cold water, wherein the outer outflow pipe conveying cold water terminates in an angled-over exit orifice having an internal screw thread into which is screwed a jet divider insert the portion of which projecting beyond the exit orifice forms a radially external annular opening for cold water and a co-axial internal tubular opening for hot water, the internal sleeve of the sleeves forming the two openings bearing tightly against a coupling pipe section which latter is secured to the outlet-side extremity of the hot water passage.

2. A fitting as claimed in claim 1, wherein the external sleeve of the jet divider insert is screwed into the internal screw thread of the exit orifice by means of an external screw thread and may be unscrewed manually for the purpose of removing the jet divider insert.

3. A fitting as claimed in claim 2, wherein the nozzle portion of the internal sleeve is outwardly chamfered conically under an acute angle and an enlarged negative pressure section is thereby formed in the cold water flow.

4. A fitting as claimed in claim 3, wherein the angle of chamfer of the internal sleeve lies between 15° and 25° with respect to the axis of the sleeve.

5. A fitting as claimed in claim 4, wherein said angle is 20°.

6. A fitting as claimed in claim 4 or 5, wherein the jet divider insert comprises fixedly cohering parts, the internal and external sleeves being firmly joined to each other via jet divided vanes, whereas the internal sleeve contains jet divider vanes departing in stellate manner from a central sleeve, and the external jet divider vanes being set back with respect to the internal sleeve in the area of the chamfer.

7. A fitting as claim d in claim 4 or 5, wherein the jet divider insert comprises a bearer element provided with th xternal screw thread and forming the external sleeve, which by means of supporting fins keeps the internal sleeve tightly joined under thrust to the coupling pipe element, an aerating ring formed from two co-axial sheet metal sleeves provided with sieves and the air suction intake passag of which is formed by an

annular gap between the bearer element and the external sheet metal sleeve, being inserted in the annular space conveying cold water between the internal and external sleeves.

8. A sanitary fitting as claimed in any of the preceding claims, wherein the outflow pipe conveying cold water is a hydraulically deformed pipe, bent through approximately a quarter-circle and tapering a little from a cylindrical inlet section to an angled-over cylindrical outlet section.

9. A sanitary fitting as claimed in claim 8, wherein a holding ring provided with an internal screw thread for the jet divider insert is secured to the angled-over outlet section.

10. A fitting as claimed in claim 9, wherein the hot water passage is a flexible tube secured at the outlet side to a connector of the angled-over coupling pipe element which is secured at the inlet side in a guiding pipe element which is co-axial to the inlet extremity of the external outlet pipe conveying cold water, within the fitting housing.

11. A fitting as claimed in claim 9, wherein the hot water passage is a copper pipe fastened at the outlet side to a connector of the angled-over coupling pipe element, which is secured at the inlet side in a guiding pipe element which is co-axial to the inlet extremity of the external outlet pipe conveying cold water, within the housing of the fitting.

12. A fitting as claimed in any of claims 1 to 7, wherein the outlet pipe conveying cold water forms a cohesive casting with a sleeve element rotatably enflanking the valve section of a mechanical mixer fitting and provided with axially separate perforations, a copper pipe also having a flattened cross-section and connected to the hot water perforation being situated within the straight portion of the external outlet pipe having a flattened cross-section are joined to the cold water perforation, said copper pipe leading at the outflow side into a coupling pipe element centred in an angled-over cylindrical nozzle element of the external outlet pipe.

13. Sanitary fittings substantially as hereinbefore described with reference to the accompanying drawings.

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